DE 196 34 370 C2:

Specification

The invention relates to a vehicle seat as generically defined by the preamble to claim 1.

Ventilated vehicle seats of this kind serve to improve the seat climate comfort, both when a person is entering a parked vehicle that is overheated from being in the sun for a fairly long time, and over the course of relatively long drives.

In a known vehicle seat of this kind (German Patent DE 41 12 631 C1), the hollow chamber extends over the full width of the middle zone and extends from the underside of the backrest to the top of it. It is limited at the back by a shell that forms the back wall of the backrest or that forms the backrest lining and that is joined to the longitudinal struts of the backrest frame. Laterally, the hollow chamber is defined by these longitudinal struts, and at the front it is defined by a support face for the backrest cushion. An air inlet and an air outlet for the hollow chamber are provided on the lower edge and the upper edge of the shell, respectively. The blower driven by an electric motor is disposed in the region of the upper end of the hollow chamber; it aspirates air out of the hollow chamber and blows it out of the air outlet at the top of the backrest, as a result of which a flow of air in the hollow chamber is effected that extends from the bottom to the top end of the hollow chamber. The support face comprises a material of low permeability to air but high permeability to water vapor, so that the moisture of transpiration emitted by the seated person to the backrest cushion in the form of water vapor, can diffuse through the support face. The water vapor

diffusion is reinforced by the cooling of the air flow through the hollow chamber, and as a consequence a sufficiently large quantity of water vapor is transported from the backrest cushion through the support face into the hollow chamber and flows downward there in the form of condensate. The seat ventilation by means of cooled air has the risk, however, of rapid overcooling of individual zones of the person's body and thus of impairing the health of vehicle passengers.

The object of the invention is to improve a vehicle seat with seat ventilation of the type defined at the outset in such a way that draft-free, uniform cooling of the body contact zones of the seated person in the case of a heated seat, without risk of an impairment to health, and the continuous dissipation of the moisture of transpiration output by the seated person can be guaranteed.

In a vehicle seat of the type defined by the preamble to claim 1, this object is attained by the invention by means of the characteristics in the body portion of claim 1.

The vehicle seat of the invention has the advantage that for the seat ventilation, uncooled air is used, which is drawn from the passenger compartment under the vehicle seat and thus from an area that is at the lowest temperature when the vehicle is parked in the sun. Measurements in the interior of vehicles parked in bright sun have shown that the temperature under the seat is approximately 30°C, while in the interior of the backrest it can rise to over 40°C and in the headroom to over 65°C. Since for reasons of strength of the backrest the blower cannot be disposed directly in the lowermost part of the hollow chamber, because that is where the stable crossbeam of the backrest frame that is important

for lateral collision safety of the backrest is located, it is assured by the air shaft according to the invention that the blower air is nevertheless aspirated from the underside of the backrest, and at the same time the aspiration distance remains relatively short.

Advantageous embodiments of the vehicle seat of the invention with expedient refinements and features of the invention are defined by the further claims.

The invention is described below in further detail in conjunction with exemplary embodiments shown in the drawing. Shown, in each case schematically, are:

Fig. 1, a longitudinal section through a backrest of a vehicle seat;

Fig. 2, a front elevation view of the backrest in Fig. 2;

Fig. 3, the same view as in Fig. 1, for a modified backrest.

The vehicle seat, in a known manner, has a seat part, not shown here, retained adjustably on the floor of the vehicle, and a backrest 10, which for adjusting its inclination is connected to the seat part via a pivot detent. The backrest 10 has a backrest cushion 11, which is embodied with a backrest surface 111 and two lateral peripheral bulges 112 and 113. The backrest cushion 11 is secured to a cushion holder, not shown here, preferably a resilient core braced in a frame, and has a cushion base 12 of rubberized hair or foam, a ventilation layer 14 of wide-mesh knitted spacer fabric through which air can flow and which covers the

cushion base 12 with the interposition of an air-impermeable foam layer 13; a pressure distribution layer 15, disposed on the ventilation layer 14, which can also comprise a wide-mesh knitted spacer fabric, a nonwoven, or an open-pore foam; and an air-permeable cushion cover 16 that covers the surface pointing toward the seated person. The ventilation layer 14 is lengthened in the surface region at the lower end via the cushion base 12 and is connected to a flexible air channel 17.

On its back side, the backrest 10 is lined with a backrest lining 18, which is disposed spaced apart from the cushion holder or cushion base 12 and which with the latter encloses a hollow chamber 19 that extends from the underside of the backrest 10 as far as the top of the backrest. The backrest lining 18 is impermeable to air and may be embodied as either a hard shell or a plastic cover. In the lower part of the hollow chamber 19, closer to the underside of the backrest 10, there is a blower 20, which is connected by its blower outlet 202 on the compression side to the flexible air channel 17 and by its blower inlet 201 on the suction side to an air shaft 21, which extends along the backrest lining 18 as far as the underside of the backrest 10, where it has an air inlet 211. The inside cross section of the air shaft 21 is no smaller at any point than the cross section of the blower inlet 201; the connection opening of the air shaft 21 to the blower is adapted to the cross section of the blower inlet 201. As can be seen from the illustration of the backrest 10 in Figs. 1 and 2, the inside cross section of the air shaft 21 is slotlike, with a relatively shallow depth and an extremely great width, and it tapers continuously from the air inlet 211 to the connection opening for the blower inlet 201. In Fig. 1, the air shaft 21 extends along the inside, toward the backrest cushion 11, of the backrest lining 18,

and advantageously one wall of the air shaft 21 is formed by the backrest lining 18. In the modified exemplary embodiment of the backrest 10 shown in Fig. 3, conversely, the air shaft 21 extends on the outside, facing away from the backrest cushion 11, of the backrest lining 18, and once again one wall of the air shaft 21 is formed by the backrest lining 18. In this case, the backrest lining 18 is provided with a flow opening 22 that is congruent with the blower inlet 201 and through which the airtight communication is made between the air shaft 21 and the blower inlet 201.

The blower 20 in the hollow chamber 19 is secured to the backrest cushion 11, or its cushion holder or its supporting cushioning, so that the blower follows the latter in the course of the spring motions thereof. To make it possible to mount the blower 20 and the backrest lining 18 independently of one another, the connection between the air shaft 21 and the blower inlet 201 is not made rigid but rather is made by means of a flexible sealing cuff or a flexible sealing ring 23. The flexible sealing ring 23 for instance comprises polyurethane foam.

When the blower 20 is switched on, air at a relatively low temperature is aspirated from the area under the vehicle seat via the air inlet 211 of the air shaft and is blown into the ventilation layer 14 of the backrest cushion 11 via the flexible air channel 17. The ventilation layer 18 through which air can flow comprises a wide-mesh knitted spacer fabric, whose vertical "ribs" form a wide mesh, so that the air can spread out in all directions and can also, when the seat is unoccupied, flow out through the air-permeable cushion cover 16 into the air space above the seat surface and as a result bring about rapid cooling down of the seat face. When the seat is occupied, the air flows along the

knitted spacer fabric of the ventilation layer 14 and emerges again at the regions of the backrest cushion 11 that are not covered by the back of the seated person and via the rearward-pointing air outlet openings 30 again. In the process, it generates a humidity gradient and carries away the air that has been moistened by transpiration from the seated person. The air outlet openings 30, which on the back side of the backrest 10 near its upper edge penetrate the backrest cushion 11 as far as the ventilation layer 14 and which can also still be filled with the knitted spacer fabric of the ventilation layer 14, prevent incoming air from flowing along the neck of the seated person.

To improve the cushion ventilation in the region of the peripheral bulges 112, 113 of the backrest cushion 11, the hollow chamber 19 has air inlet openings 24 (Fig. 2) on its underside, oriented toward the floor of the vehicle, and in each peripheral bulge 112, 113, at least near its upper end in the cushion base 12, there is an air channel 26 with a miniature fan 27 placed inside it. The air channel 26 discharges on one end in the hollow chamber 19 and on the other at the ventilation layer 14 and passes through a recess in the foam layer 13. The two miniature fans 21 additionally supply air to the region of the peripheral bulges 112, 113, and this air also flows into the ventilation layer 14 and out again via the pressure distribution layer 15 and the cushion cover 16 or the outlet openings 30. As shown in Fig. 2, there are additionally two miniature fans 27 in the lower region of the hollow chamber 19, which again are connected to an air channel 26 that penetrates the cushion base 12 and the foam layer 13.

For heating purposes, the blower 20 may be equipped with a heating coil, so that preheated air can be blown as

needed into the ventilation layer 14.

To avoid drafts and hence overcooling of sensitive areas of the seated person's back, it is expedient to provide for the following control of the blower 20 and the miniature fans 27: When the door lock is actuated, for instance by means of a key or an infrared remote control device, the blower 20 and miniature fans 27 are switched on for blowing operation at their highest stage. In a vehicle heated by sunshine while parked, air is thus aspirated from a relatively cool area under the vehicle seat and is blown through the backrest cushion 11. After a short time, during which cooling of the cushion surface has occurred for instance from 60° to 40°, the blower 20 and the miniature fans 27 are switched over to a lower rpm, either automatically or by pressing of a push button by the seat user who has entered the vehicle in the meantime. If the cooling is still too strong given the reduced air speed, for instance because the seat user already had skin or clothing moist from sweat when he entered, then by means of a further switching event the blower 20 and the miniature fans 27 are switched over to an even lower switching stage or to suction. Thus long-term operation with only slight dissipation of moisture that is nevertheless effective and comfortable is possible.

The invention is not limited to the exemplary embodiments described. For instance, the air shaft 21 may also be produced in the form of a shaft wall as a separate component, without using the backrest lining 18, and secured to the blower 20. In that case, the air shaft 21 is preferably embodied integrally with the blower housing.